

Vertical Lift by Series Hybrid Power, Phase II

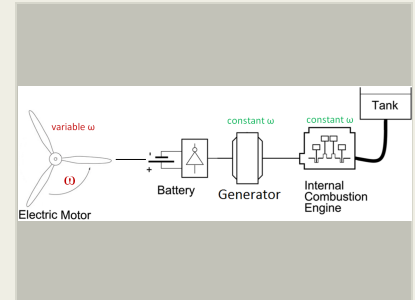
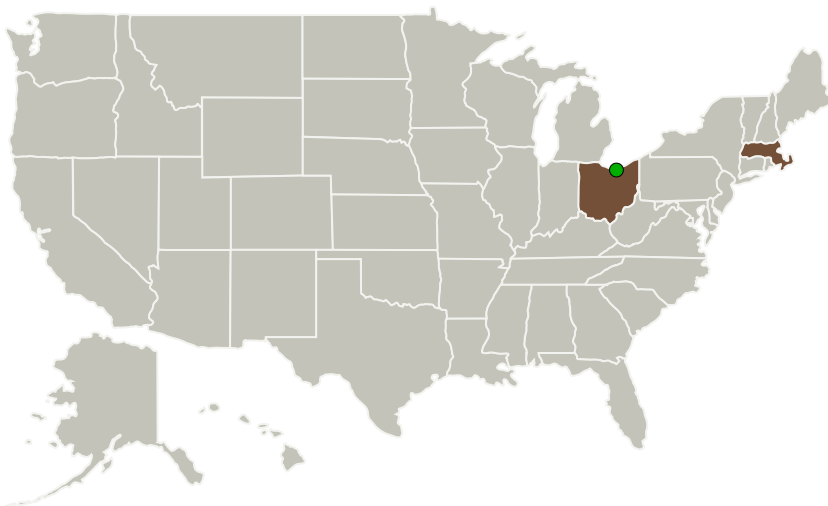
Completed Technology Project (2016 - 2018)



Project Introduction

A major market for vertical lift aircraft is in urban operations, primarily for police and electronic news gathering (typically a Bell 206 or a Eurocopter AS350). Manned systems are more costly to operate and have a much larger operational footprint than their unmanned counterparts. But the unmanned multirotor does not have the range and endurance to compete with the manned systems. Aurora Flight Sciences believes that the Passive Miller Cycle (PMC) Series Hybrid System is a viable way to achieve the range and endurance required to penetrate the manned vehicle market. The PMC, like the typical Miller Cycle, uses delayed intake valve timing that allows the expansion ratio to be greater than the compression ratio; reducing pumping losses and giving greater energy extraction. But the PMC does not use a positive displacement supercharger. The delayed intake valve closing also allows the PMC greater quench in the combustion chamber to confront the fuel droplet issue associated with small engines. The delayed valve timing also allows the generator in the hybrid system to be optimized for power generation while still being used as the engine starter. Based on the models developed in the Phase I program, Aurora will design, procure, and integrate the components required to demonstrate the Passive Miller Cycle (PMC) in a series hybrid architecture. The test system will be used to calibrate Phase I models and design a multirotor using the PMC hybrid system that will be able to perform police and news gathering missions.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Massachusetts	Ohio

Project Transitions

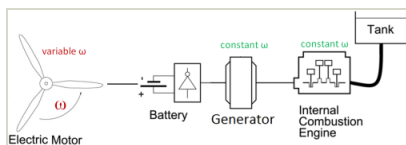
▶ **April 2016:** Project Start

✓ **April 2018:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139526>)

Images

**Briefing Chart Image**

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(<https://techport.nasa.gov/image/132473>)

Project Management

Program Director:

Jason L Kessler

Program Manager:

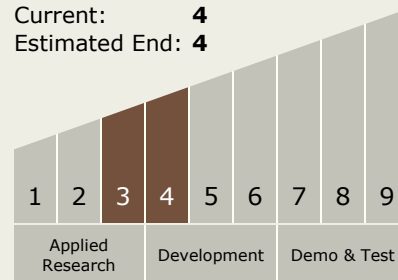
Carlos Torrez

Principal Investigator:

Van Livieratos

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - TX12.3 Mechanical Systems
 - TX12.3.2 Electro-Mechanical, Mechanical, and Micromechanisms

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Target Destinations

The Sun, Earth, The Moon,
Mars, Others Inside the Solar
System, Outside the Solar
System